INTRODUCTION

What is the *FOCUS* series?

FOCUS is a mathematics-strategy practice series. Each student book in the series provides brief instruction and concentrated practice for students in one targeted Mathematics Strategy. *FOCUS* also allows students the opportunity for self-assessment of their performance. It allows teachers the opportunity to identify and assess a student's level of mastery.

Six Mathematics Strategies featured in the *FOCUS* series:

- Building Number Sense

- Using Estimation

- Using Algebra

- Using Geometry

- Determining Probability and Averages

- Interpreting Graphs and Charts

The *FOCUS* series spans eight year levels, from year one to year eight. The introductory passages in each lesson are written at or below year level, allowing students to focus on the mathematics without struggling with the reading.

Book	Reading Level
Book A	at or below year one readability
Book B	at or below year two readability
Book C	at or below year three readability
Book D	at or below year four readability
Book E	at or below year five readability
Book F	at or below year six readability
Book G	at or below year seven readability
Book H	at or below year eight readability

What is Interpreting Graphs and Charts, the Mathematics Strategy featured in this *FOCUS* book?

Graphs and charts are used to organise and represent information. There are various types of graphs and charts. Each type is uniquely suited to represent a specific form of information. Students learn to read and interpret increasingly complex types of charts and graphs as they progress through the year levels.

Some graphs and charts are used to represent and compare amounts. Pictographs, which appear primarily in the early years, use pictures and symbols to represent amounts. Bar graphs use bars and numbers to represent amounts, and charts use words and numbers. Circle graphs show how the individual amounts in a group relate to the whole.

Graphs can be used to identify the location of places or items. Coordinate grids have a horizontal x-axis and a vertical y-axis. Numbers on the axes, called coordinates, are used to identify locations on coordinate grids. Maps represent locations and distances. Many maps include a scale, which shows how the distances on a map relate to actual distances.

Graphs can represent changes in amounts over time. Line graphs are commonly used for this purpose. Lines connect the points on a line graph. The lines represent change over time. In the later years, coordinate grids are used to show change over time. These are similar to line graphs, but the points are not connected with a line.

Students learn to interpret and apply the information displayed in graphs and charts. They answer questions that assess their ability to understand and analyse the information.

How should I use the *FOCUS* series in the classroom?

The *FOCUS* series can be used effectively in the classroom in several ways. Here is a suggestion for using the program in **whole class, large group, small group, paired** and **individual formats.**

To the Student
(inside front cover of the student book)

Read and discuss this with the whole class or large group to make sure students understand what they are to do in the book.

Learn About
(pages 2–3 of the student book)

Read the two pages of instruction in the Mathematics Strategy to the whole class or large group. Model using the Mathematics Strategy. Use information from the Mathematics Strategy Tips for the Teacher on pages 12–13 of this teacher guide to prompt additional in-depth discussion of the Mathematics Strategy, as appropriate. Make sure all students understand the features of the Mathematics Strategy and how to apply the Mathematics Strategy before they go on. The Learn About requires approximately 45 minutes.

Lesson Preview
(pages 4–5 of the student book)

Read the boxed directions to the whole class or large group. Emphasise what students should watch for as they read the problem. Have students read the problem individually. Guide the whole class or large group in answering the two selected-response questions. Then discuss why each answer choice is correct or not correct. Make sure all students understand how to answer the Mathematics Strategy questions before they go on. The Lesson Preview requires approximately 45 minutes.

Lessons
(pages 6–45 of the student book)

For each lesson, have students read the directions and the passage individually, in pairs or in small groups. Have students answer the selected-response questions and the constructed-response question individually, in pairs or in small groups.

Have students use the Tracking Chart on page 47 of the student book to note the date that they have finished each lesson. When the questions in all five lessons in a group have been corrected, have students note the number of correct responses for each lesson and then the number of correct responses for the whole group of lessons.

Each lesson, plus tracking, requires approximately 45 minutes. Allow students 30 minutes to read the passage and answer the questions, and allow 15 minutes to discuss the responses. Discuss the answers to the questions with the whole class or large group, or with pairs, small groups or individuals. (See **What is the correction procedure?** on page 4 of this teacher guide.)

Self-Assessment: When students have finished each group of five lessons, have them complete the appropriate Self-Assessment. When students have finished all twenty lessons, have them complete Self-Assessment 5. Each Self-Assessment requires approximately 20 minutes.

Discussion: When students have finished each group of five lessons, discuss their performance individually or in small groups. When students have finished all twenty lessons, discuss their performance individually or in small groups. Each discussion requires approximately 25 minutes.

MATHEMATICS STRATEGY TIPS FOR THE TEACHER

Graphs and stem-and-leaf plots are visual representations of information. They differ in the manner in which the information is organised and displayed. A bar graph shows amounts of several items. A stem-and-leaf plot shows the frequency distribution of a data set.

Reinforce understanding of this difference by asking students to identify questions that can be answered by observing either visual. (Possible questions: How many students took the test? How many students earned scores greater than 89%?) Then ask them to identify questions that cannot be answered by observing the bar graph but can be answered by observing the stem-and-leaf plot. (Possible questions: How many students earned a specific score? What is the mode of the data? What is the median of the data? What is the mean of the data? What is the range of the data?)
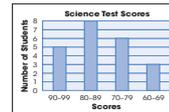
Direct students' attention to the scale map, and explain that it is a proportional representation of a location. Tell students that the relationships shown in a proportional representation accurately depict relationships found in the actual location. Point out that the segment connecting the entrance with the basketball court is 2 centimetres long and that the line segment connecting the basketball court with the swimming pool is 4 centimetres long. This shows that the actual distance from the entrance to the basketball court is half as long as the actual distance from the basketball court to the swimming pool.
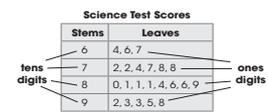

Learn About
Interpreting Graphs and Charts: Bar Graphs, Stem-and-Leaf Plots and Scale Maps

A **bar graph** uses numbers and bars to compare amounts. A **stem-and-leaf plot** shows groups of data organised by place value. The bar graph shows that 5 students scored between 90 and 99. The stem-and-leaf plot shows that these scores are 92, 93, 93, 95 and 98.
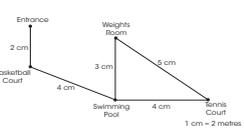
Bar Graph

Stem-and-Leaf Plot

Science Test Scores

Stems	Leaves
6	4, 6, 7
7	2, 2, 4, 7, 8, 8
8	0, 1, 1, 4, 6, 6, 9
9	2, 3, 3, 5, 8

tens digits ← → **ones digits**

A **scale map** is a proportional representation of a location. The scale is used to find the distance between points. This scale map shows that the distance between the basketball court and the swimming pool is 8 metres.

Look at the map above. Jaime walked from the swimming pool to the tennis court and then to the weights room. How far did Jaime walk in all?

From the swimming pool to the tennis court: 4 cm
From the tennis court to the weights room: 5 cm
4 + 5 = 9. Each centimetre represents 2 metres, so multiply: $9 \times 2 = 18$.
Jaime walked **18 metres** in all.

Remember:

A **bar graph** uses numbers and bars to compare amounts.
A **stem-and-leaf plot** organises data by place value.
A **scale map** is a proportional representation of a location.

Have students read the problem at the bottom of the page. Point out the key beneath the scale map. Stress that this key provides information needed to convert the relationships noted in the scale map to the actual relationships in the location. You might wish to show students how to solve the problem.

$$\frac{9}{x} = \frac{1}{2}$$
$$x = 18$$

Challenge students to identify two different routes that Jaime might walk with a length of 12 metres. (Entrance to Basketball Court to Swimming Pool; Weights Room to Swimming Pool and back to Weights Room.)

RESEARCH SUMMARY

The following is a summary of the research upon which the *FOCUS on Mathematics* series is based.

Overview

The *FOCUS on Mathematics* series is a targeted maths-strategy practice program geared towards both on-level and off-level maths students. The research summary is based on a literature review of academic monographs, journals and reports by content-area researchers and education experts.

The summary covers the following topics in support of the series *FOCUS on Mathematics*:
- Introduction to the Series
- What Is the Need for *FOCUS on Mathematics*?
- How Is *FOCUS on Mathematics* Supported by Research?
- How Does Research Support the Assessments Found in *FOCUS on Mathematics*?
- Quick-Reference Chart: From Research to Application: Strategies and Features in *FOCUS on Mathematics*

Introduction to the Series

FOCUS on Mathematics is a series designed for on-level and struggling maths students who need repeated practice. *FOCUS on Mathematics* centres on brief instruction and concentrated practice with targeted maths concepts and strategies in the context of word problems.

The *FOCUS on Mathematics* series covers:

Building Number Sense	Using Geometry
Using Estimation	Determining Probability and Averages
Using Algebra	Interpreting Graphs and Charts

What Is the Need for *FOCUS on Mathematics*?

There is a current drive in mathematics education to meet 21st-century skills so that today's students will be competitive in tomorrow's workforce. Several expert panels and mathematical organisations have sounded the alarm bell for improving students' mathematical understanding (e.g. NCTM, 2006; NMAP, 2008), as recent tests also show that students' mathematical progress is slowing (e.g. NCES, 2007).

In answer to these concerns about students' lacklustre mathematical performance, maths experts and researchers have joined forces to combat the slowing of mathematics progress.

The release of several major reports has named algebra as a "gateway to higher mathematics", which then leads to greater successes in both the academic and working lives of students (NCTM, 2006; NMAP, 2008). In response to this joint effort, these experts have also laid a pathway for students to follow in order to develop the mathematical skills and knowledge to master algebra. The *FOCUS on Mathematics* series may be an effective tool to help students along this pathway of proficiency to algebra.

The *FOCUS on Mathematics* series provides students with explicit instruction of key mathematical concepts and strategies combined with targeted practice in the context of word problems.

ANSWER KEY *(continued)*

Lesson 7 *(page 18)*
1. C   2. B   3. C   4. B
5. Solution: Danger would travel farther.
Sample Explanation: *First, I converted the ride times from minutes and seconds to minutes and then to hours.*

$$2 \text{ min } 45 \text{ sec} = 2.75 \text{ min} \approx 0.0458 \text{ hr}$$
$$2 \text{ min } 15 \text{ sec} = 2.25 \text{ min} = 0.0375 \text{ hr}$$

Then I multiplied the speed (rate) by the ride time in hours to get the total distance:

$$Danger: 120 \times 0.0458 \approx 5.5 \text{ km}$$
$$Twister: 130 \times 0.0375 \approx 4.9 \text{ km}$$

Finally, I compared the distances.

$$4.9 \text{ km} < 5.5 \text{ km}$$

Lesson 8 *(page 20)*
1. D   2. B   3. C   4. C
5. Solution: There were 140 more yearbooks sold from the end of December to the end of February.
Sample Explanation: *First, I found how many yearbooks were sold from the end of December to the end of February.*

$$360 - 120 = 240$$

Then I found how many yearbooks were sold from the beginning of September to the end of November.

$$100$$

Finally, I subtracted these two numbers to find the difference.

$$240 - 100 = 140$$

Lesson 9 *(page 22)*
1. C   2. D   3. C   4. A
5. Solution: The percentage of girls participating in sports would rise by 3%.
Sample Explanation: *First, I found how the change would effect the total number of students involved in sports.*

$$216 - 8 + 3 = 211$$

Then I found a new total for the girls.

$$18 + 13 + 24 + 30 + 24 = 109$$

Next, I calculated the percentage of sports participants who are girls.

$$109 \div 211 \approx 52\%$$

Finally, I found the difference between the new and old percentages. The previous percentage (49%) was found in problem 4.

$$52\% - 49\% = 3\%$$

Lesson 10 *(page 24)*
1. C   2. C   3. B   4. D
5. Solution: The shearer could shear 80 sheep in 2 hours.
Sample Explanation: *First, I found the number of sheep the shearer could shear in 1 hour.*

$$\frac{1.5}{1} = \frac{60}{x}$$
$$1.5x = 60$$
$$x = 40$$

Then I found the number of sheep the shearer could shear in 2 hours.

$$40 \times 2 = 80$$

Lesson 11 *(page 26)*
1. C   2. D   3. B   4. B
5. Solution: It would take 10 Megalosaurs to equal the length of 2 Supersaurs. It would take 18 Bellusaurs to equal the length of 2 Supersaurs.
Sample Explanation: *First, I found the length of 2 Supersaurs:*

$$1 \text{ Supersaurus} = 45 \text{ m}$$
$$45 \times 2 = 90 \text{ m}$$

Then I divided the length of 2 Supersaurs by the length of 1 Megalosaurus:

$$90 \div 9 = 10$$

Finally, I divided the length of 2 Supersaurs by the length of 1 Bellusaurus:

$$90 \div 5 = 18$$

Lesson 12 *(page 28)*
1. B   2. D   3. D   4. D
5. Solution: The median increases from 24 absences to 25 absences. The addition of 25 absences to the data creates 4 modes: 34, 25, 23 and 12.
Sample Explanation: *First, I found the original median by counting to find the middle numbers. The original median is 24. Then I added the new data to the stem-and-leaf plot.*

Stems	Leaves
1	2, 2, 5, 8
2	1, 3, 3, 5, 5
3	0, 4, 4, 6
4	9
5	7

Now, the middle number is 25. Next, I looked for the mode. I found that there are now 4 modes. The plot includes 2 each of the numbers 12, 23, 25 and 34.